LEARNING ABOUT VOCAL COMMUNICATION IN BIRDS

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Birdsong is of value to observers in identifying and locating unseen species. Modern advances such as magnetic high frequency tape recording and sonograms have led to a greater understanding of the subject. However, there are limitations to interpretation of sonograms. Reaction of birds to playback of songs can help distinguish sibling species and even new species. Birdsong serves varied functions such as in intra-specific recognition, females' selection of mates, spacing out of territories, and in colonial breeding species, mate or chick recognition. Variation in the songs of geographically separated birds of the same species points to the role of learning by imitation in the development of complexity of repertoire in a young bird. The role of voice in intra-specific recognition is particularly critical in the case of cryptic nocturnal species with stereotypic songs. Also significant are flight calls that keep the flock together and alarm calls that warn birds of danger.

As any birdwatcher knows, the quickest way to find out what species are in the vicinity is to learn to recognise their songs and calls. With the great increase worldwide, in studying birds, we have many new tools to familiarise ourselves with the nature and meaning of birdsong. The invention of the lightweight portable tape recorder, the publication of compact disks with collections of recorded birdsong and the development of sonograms (also called spectograms) which show the frequency band of bird calls in a plot against time, have all increased the non-specialist's knowledge of this fascinating aspect of bird behaviour.

During the 1970s and 1980s, I was able to collect recordings of 319 species mostly from Pakistan but also many from India (Roberts 1991), and during these years, being keenly focussed on their calls and song, was stimulated to continue trying to keep up to date with recent research and developments in this field.

As with all biological research, the more we learn, the more questions remain unanswered, and a brief article such as this can do no more than review current aspects, and recall some examples from personal experience.

Firstly, the increasing use of published sonograms in bird books and journals needs to be better understood by the layman and amateur such as this writer (Catchpole and Slater 1995, Slater and Sellar 2000). You cannot differentiate tone or pitch from a two-dimensional graph. A sonogram can clearly show the small dialectical differences between songs of the same species and details of the make up of the song, which would otherwise be undetectable to the human ear. Birds, it is believed from experiments, can detect higher pitched sounds up to 8,000 cycles per second, usually called 8 kHz, well beyond the limited hearing range of humans. Moreover, it is therefore possible to show side by side on a printed page, the sonograms of two or more different birds, for a leisurely and careful comparison that is not possible by actually listening to separate voice recordings. We can easily learn to recognise from the black lines and smudges on a sonograph, the types of phrases or strophes that make up a bird's song repertoire. Twittering shows closely spaced, rather short, vertical black smudges while vehement high-

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pitched calls are shown as longer darker bands in a vertical plane. Also, the louder the note, usually the wider is the black mark in a vertical plane. The sort of calls or phrases that can be verbalised as "beeze" will appear as a broad horizontal band. But again these marks should be interpreted with caution. The rapid ticking calls of some *Bradypterus* warblers can appear very similar to twittering, and one should always look carefully at the vertical graph line showing increasing kHz, as the lower down the scale, the deeper in pitch the call which may otherwise look similar in shape on the sonogram. Research in the development of sonograms and study of birdsong has now stretched over fifty years, and has come a long way from the pioneering studies by Thorpe (1958), who showed that the songs of chaffinches (*Fringilla coelebs*) which appear to be stereotyped and similar within that species, actually vary in small details both between individuals and especially between different regions, revealing the importance of dialectic variation even in species with comparatively consistent stereotyped songs. In recording the social calls of a family group of common babblers (*Turdoides caudatus*) on the western border regions of Balochistan, I found their evening territorial chorusing so different from those in the Punjab plains, as to be at first unrecognisable. I hazarded the opinion (Roberts 1992) that this showed that the population had been geographically isolated for a long period, so much so it they probably would not interact with a family flock from the Indus plains if it could be juxtaposed nearby, because it is known that this very sedentary species, living in tight family groups, maintains its territory against rival groups, by such evening choruses at the roost site. It is likely that this development of local dialects is one of the forces that lead to speciation. In Pakistan many consider the grey-winged blackbird (*Turdus boulboul*) to be the finest songster, a view shared by the great Dr. Sàlim Ali (1973) in his writings. I taped continuous songs in the Murree foothills of Pakistan, showing an unbroken sequence of hundreds of different melodious and dramatic strophes or phrases, especially in the early part of the breeding season (Roberts 1992). A few years later, on encountering a small isolated population of grey-winged blackbirds in a patch of deciduous forest at Mahandri, in Hazara district, I was astonished at the very limited and poor range of their songs. This was proof of what was already known about the importance for juvenile birds to learn their songs by imitation. Research has more recently shown that birds develop and learn the complexities of their full song in the first year of their lives, and thereafter there is no increase in variety or complexity (Dowsett-Lamaire 1979).

What then do we understand of the purpose or functions of birdsong?

Firstly, it forms an essential ingredient in intra-specific species recognition, not only for successful breeding, but in the case of highly colonial breeding species, for the recognition of one's chick, and in the clamour of a large breeding colony, the voice of one's mate. We still do not understand how the Emperor penguin (*Aptenodytes forsteri*) can recognise its offspring, apparently by voice alone, in circumstances where both parents have to be out at sea, food-hunting for prolonged periods, and where the chicks form vast huddled creches, constantly jostling for better positions in the throng. The calls of the parents are, to our ear, comparatively short and raucous and sound remarkably similar. The minute differences in pitch or phrasing are obviously not detectable to the human ear and sonograms have indeed shown that birds can detect such minute differences.

The development of high frequency magnetic recording tape, and the ability to include playback microphones with such portable tape recorders, has opened up a powerful new tool for ornithologists. Since it is only males that have elaborate territorial and mate attracting songs, the playback of recorded song in the vicinity of a certain male species can often result in an intense

aggressive or curious reaction. So much so, that this tool of playback and the degree of response by the live bird is used to recognise and distinguish sibling species and even new species (Irwin *et al.* 2001, Collinson 2001). In the view of some conservationists, there is a downside to this practice of searching for possible presence of species by playing their songs when used indiscriminately during the breeding season. However, many reputable wildlife tour operators use this tool with discrimination to enable their clients to get the best chances of viewing shy and elusive birds. The power of such recordings was well demonstrated when KingBird Tours, during an expedition to northwest China, played the calls of that skulking and shy bird, the corn crake (*Crex crex*), and eventually had the excited bird coming out of the tall grass on to an open road and pursuing the human party, calling repeatedly (King 2001).

A second vital function of birdsong, which has long been known, is mate attracting. Studies of the long and complex songs of some passerines have shown that there is a clear correlation between the success of displaying males with the longest songs and their ability to attract females, and this may be an important element in understanding why some species include a huge range of almost perfect imitations of other species' calls in their song repertoire. Dr. Sálim Ali (1972) records mimicry by *Lanius schach* of over 30 different species of birds, as well as realistic imitation of a puppy yelping. Others, including this author (Dowsett-Lemaire 1979, Roberts 1992), have also noted that the mimicry by some songsters included calls of species they could encounter only in their winter migratory territory, not in their breeding grounds. While recording the display of the Isabelline wheatear (*Oenanthe isabellina*) in Baluchistan, this author was intrigued to hear clearly, the imitated flight calls of wood sandpipers (*Tringa glareola*) and red-wattled lapwings (*Vanellus indicus*), both not found on their nesting grounds, as well as such life-like imitations of a shepherd whistling to urge his flock on and a puppy sqealing, that a nearby dog became very excited looking for the source.

Thirdly, song is also used by males to warn off rival males and to define and maintain territorial boundaries, as already discussed under the use of playing back such recordings in the field. While recording the song of the White's mountain or scaly thrush (*Zoothera dauma*) in a wide forested mountain amphitheatre, I was surprised to learn, over several evenings, how many widely spaced song posts were used by this bird, indicating the large area that it hoped to maintain as its breeding territory (Roberts 1992). On another occasion, trying to attract a collared scops-owl (*Otus bakkamoena*) for identification on a dark night, my teenage son was suddenly dive-bombed by the irate bird, to our mutual surprise and fright!

Returning to the importance of voice in intra-specific recognition, this is especially critical in nocturnal species, especially those with cryptic plumage. In our studies on the songs of scops-owls of the *Otus* genus, it soon became apparent that many sibling species which could only be separated with difficulty in the hand, and which had previously been separated only as subspecies, were in fact quite distinct sympatric, non inter-breeding species (Roberts and King 1986). The same holds true to a larger or lesser extent for many of the Caprimulgidae and Acrocephaline warblers, characteristic of skulking lifestyles, in a restricted visual habitat of reed beds.

In a short article of this nature, it is not practicable to discuss the important and varying roles also played by flight, contact and alarm calls. The importance of the continuously uttered contact calls that keep the flock together, to such gregariously foraging birds as the minivets (*Pericrocotus* spp.), as they sometimes erratically search over the forest canopy, will be apparent to any keen birdwatcher. Studies of alarm or warning

calls of small passerines have shown that they are rather low pitched and often very similar among different species. Such calls being of low frequency, carry further, and are more difficult to locate direction-wise, thus concealing the location of the alarm giver, and also enabling nearby birds of other species to respond quickly to potential danger (Catchpole and Slater 1995)

The Crane Family with their lifelong pair bonds, longevity, and courtship duetting and dancing have great appeal to many national cultures. When in flight their ringing calls, as everyone knows, carry amazing distances. Dissection of their trachea (windpipe) reveals a convolution, reminiscent of a French horn, a gradually evolved anatomical feature which must partly explain the continuous though precarious survival of this ancient bird family which needs wide open spaces far from rival pairs for nesting, yet can congregate in astonishingly huge flocks during migration. The overhead calls of even the smallest skein of cranes act as a clarion call to any small populations on the ground below.

Lastly, the importance of song in taxonomy is only recently being appreciated. We live in an era of taxonomic turmoil with the recent advances in molecular genetics and DNA sequencing forming powerful tools in examining inter-species relationships, and ultimate phylogenetic relationships are still being disputed. Yet, increasingly, sibling species are first recognised in the field as being distinct and often new species, on the basis of their taped songs and reaction to playback (Alström *et al.* 1992, Collinson 2001). Whilst the wealth of new research is teaching us more about the complexities and meaning of birdsong and calls, we should never lose sight of the aesthetic pleasure we get from being able to pause in our busy life, simply to listen and to enjoy their chorus.

References

Ali, Sálim (1972): Handbook of the Birds of India and Pakistan, Vol. 5. Oxford University Press, Bombay. Pp. 113.

Ali, Sálim (1973): Handbook of the Birds of India and Pakistan, Vol. 9. OUP, Bombay, Pp. 94-95.

Alström, P., U. Olsson & P.R. Colston (1992): A new species of *Phylloscopus* warbler from central China. *Ibis 134(4)*: 329-334.

Catchpole, C.K. & P.J.B. Slater (1995): Bird Song: Biological Themes and Variations. Cambridge University Press, Cambridge, U.K.

Collinson, Martin (2001): Greenish Warbler, Two-barred Greenish Warbler, and the speciation process. *British Birds 94(6)*: 278-283.

Dowsett-Lemaire, Françoise (1979): The imitative range of the song of the Marsh Warbler *Acrocephalis palustris*, with special reference to imitation of African Birds. *Ibis 121(4):* 453-468.

Irwin, D.E., P. Alström, U. Olsson & Z.M. Benowitz-Fredericks (2001): Cryptic species in the genus *Phylloscopus* (Old World leaf warblers). *Ibis 143(2):* 233-247.

King, Ben (2001): Tour Reports – 2001 NW China Tour, Xinjiang. *KingBird Tours, Inc. Newsletter 43*: 10. KingBird Tours, Planetarium Station, New York, USA.

Roberts, T.J. (1991): The Birds of Pakistan, Vol. 1. Oxford University Press, Karachi. Pp. 598.

Roberts, T.J. (1992): The Birds of Pakistan, Vol.2. Oxford University Press, Karachi. Pp. 617.

Roberts, T.J. & Ben King (1986): Vocalizations of the Owls of the genus *Otus* in Pakistan. *Ornis Scandinavica 7(4)*: 299-305.

Slater, P.J.B. & P.J. Sellar (2000): Understanding Sonograms. *British Birds 93(7)*: 323-329.

Thorpe, W. H. (1958): The learning of song patterns by birds, with special reference to the song of the Chaffinch *Fringilla coelebs*. *Ibis 100*: *535-570.*

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